Name: **Group:**   **Mark**   **/50 Grade:**

Customers' details are stored in the flat file database table Customer. An extract of the table is shown below.

CustomerID	Surname	Title	Phone	CarReg
JJ178	James	Mr	(0121) 343223	DY51 KKY
HG876	Habbick	Miss	(01782) 659234	PG62 CRG
EV343	Elise	Mrs	(07834) 123998	HN59 GFR
PG127	Pleston	Mr	(07432) 234543	JB67 DSF

1.

(i) State what is meant by the term 'primary key', identifying the primary key in the table above.

....

.... **[2]**

(ii) Write the SQL statement that would show only the CustomerID and Surname fields for customers with the Title "Miss" or "Mrs".

....

....

....

.... **[4]**

(iii) Describe **one** problem that would arise with the flat file database structure if a customer wanted to insure more than one car at the same time.

....

....

.... **[2]**

(iv) Describe how the flat file database structure could be altered to efficiently allow each customer to insure multiple cars at the same time. (You may assume each car is insured to only one customer.)

. **[5]**

2.   A company selling books online keeps a record of customers, products and the orders that customers make online. An order may be for several different books.

A new database system is to be created to hold this data. The following tables are suggested. (Not all fields are shown for each table)

Customer (<u>CustomerID</u>, Surname, Email)

Book (<u>BookID</u>, Title, QtyInStock)

Order (<u>Order Number</u>, Order Date, CustomerID, BookID, Quantity)

(a)   The database designer has identified a problem with the tables as they stand, and amends the tables so that the order table should be split into two tables:

Order (<u>Order Number</u>, Order Date, CustomerID)

OrderLine (<u>Order Number</u>, <u>BookID</u>, Quantity)

Explain why this change is necessary.   [2]

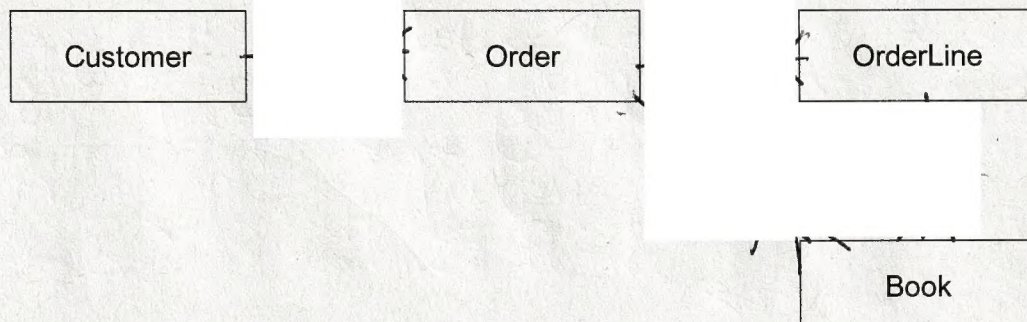(b)   Explain what is meant by a **foreign key**. Identify two foreign keys in one of the tables in the amended database.   [2]

(c)   What is a **composite key**? Identify a composite key in one of the tables in the amended database.   [2]

(d)   Complete the following entity relationship diagram to show the degree of the relationships that exist between the entities.   [3]

| Customer | Order | OrderLine |

| Book |

3. An insurance company keeps details about vehicles that it insures, policy holders and insurance policies.

The details are held in a relational database using the following relations. (Not all fields are shown.)

Vehicle

RegistrationNo	VARCHAR (8)
Make	VARCHAR (12)
Model	VARCHAR (15)
Colour	VARCHAR (12)
DateRegistered	DATE (dd/mm/yy)

Policy

PolicyNumber	CHAR (8)
ExpiryDate	DATE (dd/mm/yy)
ExcessAmount	Currency (integer, e.g. 500)

Owner

OwnerID	CHAR (6)
Firstname	VARCHAR (15)
Surname	VARCHAR (20)
DateOfBirth	DATE (dd/mm/yy)
Address	VARCHAR (30)
Postcode	VARCHAR (10)

Some policy holders may have several vehicles insured. Each vehicle has a unique insurance policy.

(a) Write the three relations in the format

TableName (attribute1, attribute 2, ...)

Show how the tables will be related using foreign keys.

Underline the primary key of each table, and identify any foreign keys with an overbar.
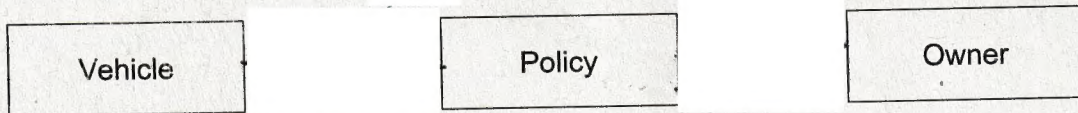
e.g. $\overline{foreignkey}$

[6]

(b) Complete the entity relationship diagram below showing the degree of the relationships between the entities. [3]

Vehicle	Policy	Owner

(c) Write SQL statements to extract the following data:

   (i) the registration number, make, model and date registered of all vehicles with dateRegistered before 2015, displayed in order of date registered [3]

   (ii) The Policy number, registration number and make of all cars with an ExcessAmount of 500 or more in descending order of ExcessAmount. [4]

4 A school keeps records of school trips on a database. There are four tables in the database named PUPIL, TRIP, TEACHER, PUPILTRIP defined as follows:

PUPIL(PupilID, PupilSurname, PupilFirstName)

TRIP(TripID, Description, StartDate, EndDate, Destination, NumberOfStudents, TeacherID)

TEACHER(TeacherID, Title, FirstName, Surname)

PUPILTRIP(PupilID, TripID)

a) Draw an entity relationship diagram showing the relationship between the entities. [2]

b) Write SQL statements for each of the following operations:
  (i)   Find the first name and surname of all pupils who went on a trip with TripID 14 [2]

  (ii)   Find all the trips for which the teacher with surname "Black" has been in charge, giving the teacher's title and surname, trip description and start date, sorted in descending order of start date.   [4]

5 A school keeps data about each of its pupils. State the most suitable data type for each of the following data items:

Pupil's surname

A single letter indicating whether they are male or female

The amount owed for school trips

The number of school trips they have participated in

Whether or not the pupil is entitled to free school meals

Student's date of birth   [5]

Total 50 marks